Listing of Claims

1. (Currently Amended) A process for realizing fluid microchannels buried in an integrated structure comprising a monocrystalline silicon substrate, comprising:

forming in said substrate at least a trench; and

obtaining said fluid microchannels starting from a deep cavity characterized by a small surface port obtained through anisotropic etching of said at least one trench, said fluid microchannels being nearly entirely buried in said substrate in a completely monocrystalline structure which closes the surface port along a certain length of the fluid microchannel.

2. (Currently Amended) The process according to claim 1:

wherein forming comprises:

depositing a mask above said substrate;

opening of windows having a convenient width; and

plasma etching which uses said mask to form said trenches having side walls being essentially orthogonal to the surface of said substrate; and

wherein obtaining comprises:

wet anisotropic etching to form, starting from said trenches, said fluid microchannels, said anisotropic etching step providing different etching speeds due to different atom coordination.

3. (Currently Amended) The process according to claim 2, wherein <u>anisotropic</u> ~~plasma~~ etching is performed with a TMAH or KOH solution.

4. (Original) The process according to claim 2, wherein opening the windows having a convenient width is performed through photolitographraphy and subsequent plasma etching.

5. (Original) The process according to claim 2, wherein deposition of a mask above said substrate comprises a silicon nitride deposition through the CVD deposition.

6. (Original) The process according to claim 2, wherein deposition of a mask above said substrate comprises a heavily doped monocrystalline layer deposition.

7. (Original) The process according to claim 6, wherein the heavily doped monocrystalline layer has a dopant concentration higher than 10^{19} atoms/cm^3.

8. (Currently Amended) The process according to claim 1, further comprising a convenient epitaxial new growing operation effective to close an upper part of said <u>fluid</u> microchannels and completely bury the <u>fluid</u> microchannels in monocrystalline silicon.

9. (Currently Amended) The process according to claim 1, further comprising an oxide, polysilicon or nitride deposition effective to close an upper part of said <u>fluid</u> microchannels and completely bury the <u>fluid</u> microchannels.

10. (Currently Amended) The process according to claim 1, wherein the wet anisotropic etching step turns said side walls of said trenches into a pair of rotated v-grooves orthogonal to a surface of said substrate and defining rombohedron-shaped fluid microchannels.

11. (Original) The process according to claim 1, further comprising depositing a layer of material having a low etching speed.

12. (Original) The process according to claim 11, further comprising plasma etching effective to open a region at a trench base.

13. (Original) The process according to claim 11, further comprising removing of said layer and in an etching of said substrate in a lower part of said trenches before said plasma etching step.

14. (Canceled) An integrated structure, comprising:

at least a monocrystalline silicon substrate wherein at least one microchannel is formed which is nearly entirely buried inside said substrate.

15. (Canceled) The integrated structure according to claim 14, wherein the microchannel has a generally rhombohedral cross-sectional shape.

16. (Canceled) The integrated structure according to claim 14, further comprising an epitaxially grown silicon layer above the silicon substrate to completely enclose the microchannel in monocrystalline silicon.

17. (Canceled) The integrated structure according to claim 14, further comprising a layer above the silicon substrate to close completely enclose the microchannel.

18. (Canceled) The integrated structure according to claim 17, wherein the layer is an oxide, polysilicon or nitride deposition effective to close an upper part of said microchannel and completely bury the microchannel.

19. (Currently Amended) A method for forming fluid microchannels, comprising:

forming a narrow elongated trench in a monocrystalline silicon substrate;

performing an anisotropic wet etch of the narrow elongated trench to form a fluid microchannel structure having a generally rhombohedral cross-sectional shape with a top port substrate surface opening; and

closing the top port substrate surface opening of the fluid microchannel structure along a certain length of elongated trench to entirely enclose the fluid microchannel structure.

20. (Currently Amended) The method of claim 19 wherein closing comprises epitaxially growing monocrystalline silicon on a surface of the substrate to entirely enclose the fluid microchannel structure in monocrystalline silicon.

21. (Original) The method of claim 19 wherein the anisotropic wet etch is made using a TMAH solution.

22. (Currently Amended) The method of claim 19 wherein the anisotropic wet etch is made using a KOH ~~KHOH~~ solution.

23. (Original) The method of claim 19 wherein forming comprises defining a mask with an opening therein at the location of the trench and plasma etching though the mask opening to form the narrow elongated trench.

24. (Original) The method of claim 19 wherein the narrow elongated trench has a width at the surface of the substrate of about 1 micrometer.

25. (Original) The method of claim 24 wherein the narrow elongated trench has a depth from the surface of the substrate of about 9 micrometers.

26. (Original) The method of claim 19 wherein closing comprises depositing a layer of material to close the top port substrate surface opening.

27. (Original) The method of claim 26 wherein layer of material is a material taken from the group consisting of a polysilicon, a nitride or an oxide.

28. (Currently Amended) A method for forming fluid microchannels, comprising:

forming a monocrystalline silicon layer over a monocrytalline silicon substrate;

forming a narrow elongated trench through the monocrystalline layer and into the monocrystalline silicon substrate;

performing an etching of a base region of the narrow elongated trench to form a fluid microchannel structure having a top port opening; and

closing the top port opening of the fluid microchannel structure along a certain length of the elongated trench to entirely enclose the fluid microchannel structure.

29. (Currently Amended) The method of claim 28 wherein closing comprises growing monocrystalline silicon to close the top port opening in trench above the formed fluid microchannel structure and produce the fluid microchannel structure enclosed completely in monocrystalline silicon.

30. (Currently Amended) The method of claim 28 wherein performing comprises anisotropically wet etching the base region to define the fluid microchannel structure with a generally rhombohedral cross-sectional shape.

31. (Original) The method of claim 30 wherein the anisotropic wet etch is made using a TMAH solution.

32. (Currently Amended) The method of claim 30 wherein the anisotropic wet etch is made using a KOH ~~KHOH~~ solution.

33. (Original) The method of claim 28 wherein forming the narrow elongated trench comprises defining a mask with an opening therein at the location of the trench and plasma etching though the mask opening to form the narrow elongated trench.

34. (Original) The method of claim 28 wherein closing comprises depositing a layer of material to close the top port opening.

35. (Original) The method of claim 34 wherein layer of material is a material taken from the group consisting of a polysilicon, a nitride or an oxide.

36. (New) A process, comprising:

forming an elongated trench in a monocrystalline silicon substrate;

anisotropic etching of said elongated trench to obtain a deep cavity characterized by an elongated surface port; and

closing at least a portion of the elongated surface port of the elongated trench to define with the deep cavity in the silicon substrate a tunnel-like microchannel.

37. (New) The process of claim 36 wherein forming the elongated trench comprises plasma etching the substrate through a mask to form said trench having side walls being essentially orthogonal to the surface of said substrate.

38. (New) The process of claim 37 wherein anisotropic etching comprises wet anisotropic etching to form, starting from said trench, said deep cavity, said anisotropic etching providing different etching speeds due to different atom coordination

39. (New) The process of claim 36, wherein closing comprises epitaxial new growing so as to close the elongated surface port and bury the deep cavity in monocrystalline silicon.

40. (New) The process of claim 36, wherein closing comprises an oxide, polysilicon or nitride depositing effective to close close the elongated surface port and bury the deep cavity.